

NON-PUBLIC?: N  
ACCESSION #: 8801120038

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Davis-Besse Unit 1 PAGE: 1 of 4

DOCKET NUMBER: 05000346

TITLE: Unit Trip Due to Loss of Instrument Air Pressure  
EVENT DATE: 12/07/87 LER #: 87-015-00 REPORT DATE: 01/06/88

OPERATING MODE: 1 POWER LEVEL: 081

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: C. T. Daft, Technical Planning Superintendent  
TELEPHONE #: 419-249-2373

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: LD COMPONENT: DSV MANUFACTURER: A610  
CAUSE: X SYSTEM: SB COMPONENT: PS MANUFACTURER: M235  
CAUSE: X SYSTEM: SB COMPONENT: ISV MANUFACTURER: P305

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On December 7, 1987 the unit experienced a reactor trip at 0656 hours from 81 percent reactor thermal power. The initiating event was a loss of Instrument Air pressure which caused several secondary system valves to go to their failed position. Reactor power increased to the Integrated Control System (ICS) high demand limiter. Feedwater flow increased causing Reactor Coolant System Tave to decrease. Due to a large moderator temperature coefficient, reactor power increased to the Reactor Protection System high flux trip setpoint.

The post-trip plant response was normal except that Steam Generator 1-1 pressure was slightly lower and Steam Generator 1-2 level was higher than the expected post trip ranges. Operator actions were required to close the Moisture Separator Reheater (MSR) second stage reheat steam source valves and to stabilize Steam Generator 1-1 water levels.

The loss of instrument air pressure was caused by direct venting of the Instrument Air header to atmosphere when a solenoid valve failed on

Instrument Air Dryers 1-1 and 1-2. This solenoid valve was repaired. The MSR second stage reheat steam source valves did not close due to a pressure switch failure. This switch was replaced. The ICS did not respond fast enough to Steam Generator 1-1 decreasing water level. A modification to the ICS is scheduled for the fifth refueling outage to improve its response.

(End of Abstract)

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#### Description of Occurrence:

On December 7, 1987 the reactor was in Mode 1 at 81 percent reactor thermal power. The Reactor Protection System (RPS)(JD) high flux trip setpoint was set at 85.6 percent reactor thermal power due to three main steam safety valves having been previously declared inoperable (two valves in one steam header and one in the other).

At 0643 a low pressure instrument air (LD) pressure alarm was received in the control room. The low instrument air pressure caused several valves in the steam and feedwater systems to open and dump steam and condensate to the condenser. The Integrated Control System (ICS) (JA) responded by increasing feedwater flow and pulling control rods out. Reactor power increased and at 0654 reached the ICS high demand limiter setpoint of 84.4 percent reactor power. Increased feedwater flow caused a decrease in the Reactor Coolant System (RCS) (AB) Tave. Due to the large moderator temperature coefficient late in core life, the Tave decrease caused a reactor power increase sufficient to cause a high flux trip on the Reactor Protection System. This resulted in a reactor trip at 0656.

All systems operated as expected except for:

- a. The Moisture Separator Reheater (MSR) (JB) second stage reheat steam source valves MS199 and MS314 and the MSR second stage reheat steam low load valves MS338 and MS353 did not automatically close. Operator action was required to close these valves.
- b. The Turbine Bypass Valves did not act in unison. SP13A2 did not open upon the reactor trip. SP13B3 opened upon the reactor trip, but did not close until approximately 7 minutes later.
- c. An operator took manual control of startup feedwater (JJ) valve SP7B in anticipation of a possible Steam and Feedwater Rupture Control System (SFRCS) (JB) actuation as the Steam Generator 1-1 water level was decreasing towards the low level trip setpoint.

d. Steam Generator 1-1 pressure decreased to below its normal post trip minimum value. Steam Generator 1-2 level remained above its normal post trip maximum value throughout the event.

The operators identified the Instrument Air Dryers (DRY) as the source of the instrument air loss. The air dryers were isolated and bypassed establishing normal instrument air header pressure at 0714.

This event is being reported as an automatic unit shutdown under 10CFR50.73(a)(2)(iv).

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#### Designation of Apparent Cause of Occurrence and Corrective Action:

A schematic of the Instrument Air Dryer system is shown in attachment 1. The loss of Instrument Air pressure occurred when a solenoid (PSV) (ASCO Catalog 1179237) valve (IAV) failed in the Instrument Air Dryer 1-1 and 1-2 package (Pall Trinity Micro Corporation Model 401HA4-0000CSH). This caused Instrument Air Valve IA 26 to remain open when it should have been closed. A flowpath to atmosphere was created which resulted in a decrease of instrument air pressure from a normal pressure of 100 psig to approximately 74 psig. Maintenance Work Order (MWO) 1-87-3833-01 replaced the solenoid valve for instrument air valve IA26 on 12-10-87. Modification 87-1138 was implemented to complete the Instrument Air Dryer 1-3 and 1-4 installation. These new air dryers have been placed in service. The instrument air dryer solenoid valves are being evaluated to determine what preventative maintenance program requirements should be applied.

MSR second stage reheat steam source valves (ISV) MS199 and MS314 did not automatically close because pressure switch (PS) PS-9806 (Mercoid Model DPSW-7233-153-R-64) failed due to a crack (leak) through the switch body. This pressure switch was replaced on 12-9-87 under MWO 1-87-2668-02.

This pressure switch is being evaluated to determine what preventative maintenance program requirements should be applied.

The MSR second stage reheat steam low load valves (PV) MS338 and MS353 did not automatically close because they were in manual control. Manual control had been established at reduced power levels, earlier, because their pressure loop controllers required tuning. The valve controls had been left in manual upon return to increased power levels. MWO 1-87-3893-00 has been written to check the MSR second stage reheat steam system dynamics. This information will then be used to tune the pressure loop controllers as necessary. MWO 1-87-3893-00 is scheduled for implementation in January 1988.

The Turbine Bypass Valves (PCV) normally open on a reactor trip and fail closed when instrument air pressure to their pneumatic solenoid decreases to approximately 75 psig. The valves did not act in unison because of each valve's particular sensitivity to the instrument air pressure which had decreased to approximately 74 psig. Post trip testing confirmed that had a complete loss of Instrument Air occurred, all the valves would have closed in unison. However the testing did reveal that the response of five of the six valves was sluggish although considered acceptable. Upon disassembly of the Turbine Bypass Valve pneumatic solenoids (PSV) their O-Rings were found degraded. These O-Rings were replaced on 12-9-87 under MWO's 1-87-4049-00 and 1-87-4037-00. The valves were restroked following maintenance with satisfactory results. Turbine Bypass Valves are being evaluated to determine what preventative maintenance program requirements should be applied.

Manual control of Steam Generator 1-1 Startup Feedwater Valve (LCV) SP7B was necessary because the Integrated Control System (ICS) did not respond quickly enough to the Steam Generator 1-1 decreasing water level. Modification 87-1174 had previously been developed

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to improve the responses of the ICS to decreasing steam generator water levels. This modification is scheduled to be implemented during the fifth refueling outage.

The Steam Generator 1-1 pressure was slightly lower and Steam Generator 1-2 level was higher than their expected post trip ranges. This was caused by unbalanced steaming of Steam Generator 1-1 due to Turbine Bypass Valve SP13B3 being open while the remaining Turbine Bypass Valves were shut and leakage past the MSR 1-1 Second Stage Reheat source valve MS199 (William Powell Figure 16023WE) after MS199 was locally closed by the operators. The leakage past MS199 was evaluated and determined acceptable for continued operation. MWO 1-86-1613-38 has been written to check the seat leakage on MS199 and repair as necessary. This MWO is scheduled to be implemented during the fifth refueling outage.

#### Analysis of Occurrence:

All systems functioned as expected for a loss of instrument air. The post-trip response of the unit was normal with the exception that Steam Generator 1-1 pressure decreased to 902 psig as compared to the normal minimum expected value of 925 psig and Steam Generator 1-2 levels ranged from 60 to 80 inches as compared to a normal post trip range of 18 to 60 inches. These conditions did not have any actual or potential safety significance.

Failure Data:

This is the first Davis-Besse Reactor Trip caused by a loss of Instrument Air Pressure.

Previous LER's have addressed similar equipment problems. In particular LER 87-010 addressed the failure of pressure switch PS-9806 to isolate MS199 and MS314. The pressure switch had been refurbished; however, the crack, if preexisting, had not been detected. This refurbishment permitted reinstallation until a new switch could be procured and installed. The new switch has now been installed as noted in this LER. LER's 87-011 and 85-013 address the failure of the Turbine Bypass Valves. These failures were different than that noted in this LER in that during this transient the valves functioned as expected to this loss of Instrument Air.

REPORT NO: NP-33-87-18 PCAQ NO(s): 87-0661

ATTACHMENT # 1 TO ANO # 8801120038 PAGE: 1 of 1

FIGURE OMITTED - NOT KEYABLE (DRAWING)

ATTACHMENT # 2 TO ANO # 8801120038 PAGE: 1 of 1

January 6, 1988 TOLEDO EDISON  
EDISON PLAZA  
300 MADISON AVENUE  
TOLEDO, OHIO 43652-0001

Log No: KA88-0001  
File: (NP-33-87-18)

Docket No. 50-346  
License No. NPF-3

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Gentlemen:

LER NO. 87-015  
Davis-Besse Nuclear Power Station Unit No. 1  
Date of Occurrence December 7, 1987

Enclosed is Licensee Event Report 87-015 which is being submitted in accordance with 10CFR50.73 to provide 30 day written

notification of the subject occurrence.

Yours truly,  
/s/ Louis F. Storz  
Louis F. Storz  
Plant Manager  
Davis-Besse Nuclear Power Station

LFS/ed  
Enclosure  
cc: Mr. A. Bert Davis  
Regional Administrator  
USNRC Region III

Mr. Paul Byron  
DB-1 NRC Resident Inspector

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